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EXAMINER	
DOTE, JANIS L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/606,750	TODA ET AL.
	Examiner	Art Unit
	Janis L. Dote	1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7-26,28 and 29* is/are pending in the application.

4a) Of the above claim(s) *24-26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7-23,28 and 29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1,7-26,28 and 29* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/15/05;4/10/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The examiner acknowledges the amendments to claims 1, 7-9, and 19, the cancellation of claims 2-6 and 27, and the addition of new claim 29 set forth in the amendment filed on Mar. 9, 2006. Claims 1, 7-26, 28, and 29 are pending.

Claims 24-26 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicants timely traversed the restriction (election) requirement in the reply filed on Nov. 23, 2005.

2. The "Amendment to the claims" section filed on Feb. 22, 2006, did not comply with 37 CFR 1.121 for the reasons discussed in the "Notice of non-compliant amendment" mailed on Mar. 6, 2006. Accordingly, the "Amendment to the claims" section filed on Feb. 22, 2006, has not been entered.

3. The examiner has considered the US applications listed on "List of related cases" in the Information Disclosure statements filed on Nov. 15, 2005, and Apr. 10, 2006.

4. The objection to the specification set forth in the office action mailed on Nov. 25, 2005, paragraph 5, has been withdrawn

in response to the amended paragraph beginning at page 6, line 15, of the specification, filed on Feb. 22, 2006.

The rejections of claims 19 and 27 under 35 U.S.C. 112, first paragraph, set forth in the office action mailed on Nov. 25, 2005, paragraph 9, have been withdrawn in response to the amendment to claim 19 and the cancellation of claim 27 set forth in the amendment filed on Mar. 9, 2006.

The rejections under 35 U.S.C. 103(a) of claims 1-6, 8, 16, and 28 over US 5,567,559 (Yang) combined with US 6,623,899 B2 (Takaya), of claims 9-14, 17, and 19-23 over Yang combined with Takaya and the other cited prior art, of claims 1-6, 8, 10, 14-16, and 28 over Yang combined with US 6,399,262 (Oshiba), and of claims 10-14 over Yang combined with Takaya and US 2003/0073015 A1 (Tamoto), set forth in the office action mailed on Nov. 25, 2005, paragraphs 11-14, 18, and 20, respectively, have been withdrawn in response to the amendments to claims 1 and 28 set forth in the amendment filed on Mar. 9, 2006. The amendment to claim 1 added the limitation that the charge generating material is a titanyl phthalocyanine, which has an X-ray diffraction spectrum, wherein "said titanyl phthalocyanine [sic] a peak . . . at an angle of $23.5° \pm 0.2°$." The amendment to claim 28 adds the limitation that the titanyl phthalocyanine is represented by the formula (1) recited in

claim 28. The Yang ammonium modified titanyl phthalocyanine is outside the scope of formula (1) recited in instant claim 28. For the reasons noted by applicants in their response filed on Feb. 22, 2206, the Yang ammonium modified titanyl phthalocyanine also does not have a X-ray diffraction spectrum showing a peak at a Bragg angle of $23.5^\circ \pm 0.2^\circ$ as recited in instant claim 1.

In the response filed on Feb. 22, 2006, page 18, lines 1-4, applicants state that claim 15 should be allowable because it was not rejected over prior art in the office action mailed on Nov. 25, 2005. However, contrary to applicants' statement, claim 15 was rejected under 35 U.S.C. 103(a) over Yang combined with Oshiba. See the office action mailed on Nov. 25, 2005, paragraph 18. That rejection is now withdrawn for the reasons discussed above.

5. The amendments to claims 1 and 28 set forth in the amendment filed on Mar. 9, 2006, described <u>supra</u>, and the addition of claim 29, which requires that the titanyl phthalocyanine have an X-ray diffraction spectrum having a peak at an angle of $23.5^\circ \pm 0.2^\circ$, necessitated the new ground of rejections set forth <u>infra</u>.

6. Claims 1 and 29 are objected to because of the following informalities:

In claims 1 and 29, the phrase "said titanyl phthalocyanine [sic] a peak . . . at an angle of 23.5° $\pm$ 0.2°." because it is missing a verb.

Appropriate correction is required.

7. The instant specification at page 12, lines 14-21, discloses that the term "surface roughness" recited in the instant claims "means the ten point mean roughness which can be measured by a method based on JIS B0601. Specifically, the roughness is represented by the difference between the average height of the five projected portions and the average depth of the five recessed portions in a unit length."

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1, 7, 8, 10-14, 16-20, 22, 23, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0076633 A1 (Niimi'633), as evidenced by applicants' admission at page 87, lines 22-23, of the instant specification (applicants' admission I), combined with: (1) US 6,268,096 B1

(Nukada), as evidenced by the ACS File Registry RN 26201-32-1; and (2) US 6,623,899 B2 (Takaya).

Niimi'633 discloses an electrophotographic photoreceptor comprising an electroconductive substrate; an undercoat layer; a charge generation layer; a charge transport layer formed on the charge generation layer using a halogen-free solvent; and a protective layer. The charge generation layer comprises a polyvinyl butyral resin and a bisazo charge generation material. The charge transport layer is obtained by coating the charge generation layer with a coating solution comprising a binder resin, a charge transport compound, and the solvent tetrahydrofuran. The protective layer comprises a charge transport polymer comprising a triarylamine moiety in a side chain and a particulate alumina filler having a specific resistivity of 2.5 x 10^{12} $\Omega\cdot m$. See refining example 6 at pages 24-25, paragraphs 0346-0351; pages 25-26, paragraphs 0358 to 0367; and example 6 at page 27, paragraphs 0380-0381. The Niimi'633 charge transport layer meets the charge transport layer limitations recited in instant claims 1, 16, and 28. The protective layer in example 6 meets the protective layer limitations recited in instant claims 10-12 and 14.

Niimi'633 does not identify its alumina filler as an "α-alumina" as recited in instant claim 13. However, as

discussed supra, the Niimi'633 alumina filler has a specific resistivity of 2.5×10^{12} Ω·m. The instant specification discloses an "α-alumina" having a specific resistivity of 2.5×10^{12} Ω·m. Instant specification, page 87, lines 22-23. Because the Niimi'633 alumina filler has the same specific resistivity as the "α-alumina" disclosed in the instant specification and is used for the same purpose as a filler in a protective layer for a photoreceptor, it is reasonable to presume that the Niimi'633 alumina filler is an "α-alumina" as recited in instant claim 13. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Niimi'633 further discloses that its photoreceptor may be used as the photoreceptor in an image forming apparatus or a process cartridge. The image forming apparatus comprises at least one image forming unit, which comprises a photoreceptor **1**, a charger **8**, a light irradiator **5**, an image developer **11**, and a transfer device **15**. Page 4, paragraph 0061; Fig. 3; and page 21, paragraphs 0300-0305. Niimi'633 teaches that the light irradiator is preferably a laser diode or a light emitting diode as recited in instant claim 19, and that the charger is preferably a contact charger or a proximity charger as recited in instant claims 20 and 22. Page 4, paragraph 0062; and page 21, paragraph 0304. Niimi'633 further teaches that the

image forming apparatus can comprise a plurality of image forming units. See Fig. 7, and pages 22-23, paragraphs 0321-0324. The Niimi'633 process cartridge comprises a photoreceptor **43**, and at least one of a charger **40**, an image irradiator **41**, or an image developer **45**. Page 5, paragraph 0063; Fig. 5; and page 22, paragraph 0319.

Niimi'633 does not exemplify a charge generation layer comprising a charge generation material having an average particle diameter as recited in the instant claims. However, Niima'633 discloses that the charge generation material in the charge generation layer can equally be a phthalocyanine pigment. Page 10, paragraph 0151, line 1-2.

Nukada teaches a titanyl phthalocyanine crystal that exhibits an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.3°, a lowest peak at 7.5°, a peak at 9.7°, no peak at 26.3°, and a peak at 23.5°. See example 4 at cols. 7-8 and Fig. 4. The interval between the peaks at angles of 7.5° and 9.7° meet the limitation "an interval . . . is not less than 2.0°" recited in instant claims 1 and 28. The peaks at 27.3°, 7.5°, 9.7°, and 23.5°, and no a peak at 26.3° meet the peaks in the "X-ray diffraction spectrum" recited in instant claims 1, 28, and 29. The location of the peaks at angles 7.5°, 9.7°, and 23.5° were determined by measuring the positions of the

peaks with a ruler and correlating the positions with the x-axis in Fig. 4. Nukada does not explicitly disclose the chemical structure of its titanyl phthalocyanine. However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. According to Nukada, its titanyl phthalocyanine crystal comprises uniform particles having an ellipsoidal tabular form, which have a primary particle diameter of 0.05 to 0.08 μm and a BET specific surface area of 40 m^2/g. See Example 4. Thus, the titanyl phthalocyanine crystal meets the compositional limitations recited in instant claims 1, 7, 8, 28, and 29, and the average particle size limitation of not greater than 0.3 μm recited in instant claims 1 and 28. Nukada further discloses a charge generating layer where the layer is formed by coating a coating solution comprising a polyvinyl butyral binder resin, the titanyl phthalocyanine crystal of example 1, and a solvent. Col. 9, lines 39-44. According to Nukada, when a photoreceptor comprises a charge generation layer comprising its titanyl phthalocyanine crystal, the photoreceptor has excellent photosensitivity, stability, and durability. Col. 1, lines 60-63; col. 4, lines 44-46; and col. 12, lines 13-26.

Nukada does not explicitly disclose that the X-ray diffraction pattern is obtained when a Cu-Kα X-ray having a wavelength of 1.542 Å is used, as recited in instant claims 1 and 28. However, as discussed supra, the X-ray diffraction pattern of the Nukada titanyl phthalocyanine meets the "X-ray diffraction spectrum" recited in instant claims 1, 28, and 29. Thus, it is reasonable to conclude that the X-ray diffraction spectrum disclosed in Nukada is obtained when a Cu-Kα X-ray having a wavelength of 1.542 Å is used. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Instant claim 7 is written in product-by-process format. Nukada does not disclose that its charge generation layer is formed by the method recited in the instant claim 7. However, as discussed above, the Nukada titanyl phthalocyanine crystal comprises particles having a primary particle diameter of 0.05 to 0.08 µm. The primary particle diameters of 0.05 to 0.08 µm meet the average particle size limitation of "not greater than 0.3 µm" recited in instant claim 7. Because the Nukada primary particle diameters of 0.05 to 0.08 µm are much smaller than the average particle size limitation of not greater than 0.3 µm recited in instant claim 7, it is reasonable to conclude

that the Nukada titanyl phthalocyanine crystal meets the particle size standard deviation of "not greater than 0.2 μm" recited in instant claim 7. Thus, it appears that the charge generation layer disclosed by Nukada is the same or substantially the same as the instantly recited charge generation layer made by the process recited in instant claim 7. The burden is on applicants to prove otherwise. In re Marosi, 218 USPQ 289 (Fed. Cir. 1983); In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985); MPEP 2113.

Instant claim 8 is written in product-by-process format. Nukada does not disclose that its titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the Nukada titanyl phthalocyanine material exhibits an X-ray diffraction pattern that meets the limitations recited in instant claims 1, 28, and 29, and the particle size limitation of "not greater than 0.3 μm" recited in instant claims 1 and 28. Therefore, it appears that the titanyl phthalocyanine material disclosed by Nukada is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Nukada, to use the

charge generation layer coating solution taught by Nukada to form the charge generation layer in the photoreceptor disclosed by Niimi'633, and to use the resultant photoreceptor in the image forming apparatus and process cartridge disclosed by Niimi'633. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have excellent photosensitivity, stability, and durability.

Niimi'633 also does not exemplify a photoreceptor comprising an undercoat layer having the surface roughness as recited in the instant claims. However, Niimi'633 does not limit the type of undercoat layer used. Page 12, paragraph 0180; and reference claim 22.

Takaya teaches the use of a particular intermediate layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member. Takaya discloses that the intermediate layer has a layer thickness of at least 0.5 μm and comprises aggregated particles of $Al_2O_3 \cdot nH_2O$, where n is a number of at least 0 representing "a degree of hydration." Col. 3, lines 55-63. Takaya teaches that the intermediate layer preferably has a 10-point surface roughness Rz (according to JIS B06010) of "0.1 to 1 μm so as to provide improved function of

preventing the occurrence of interference fringes sometimes encountered in an electrophotographic apparatus of a digital scheme using coherent light such as laser light as exposure light." Col. 7, lines 1-8. Takaya exemplifies an intermediate layer having a 10-point surface roughness Rz of 0.5 μm. See, for example, example 1, col. 10, lines 13-27. Takaya discloses that its intermediate layer "can be formed in a crack-free state inexpensively and without requiring a special technique by using a coating liquid of a good storage stability." Col. 3, lines 34-37. According to Takaya, prior art intermediate layers comprising a polyamide resin are "liable to have an electrical resistance which is liable to change depending on environmental changes, so that it has been difficult to provide an electrophotographic photosensitive member having stable and excellent potential characteristics in all environments ranging from low temperature/low humidity to high temperature/high humidity." Col. 2, lines 14-27. Takaya discloses that photosensitive members comprising its particular intermediate layer solve the above-mentioned problems of the prior art. Col. 3, lines 27-30. Takaya discloses that such photosensitive members exhibit "excellent potential characteristic and image forming characteristic free from difficulties, such as lower image density or black spots and fog, over a variety of

temperature and humidity environment conditions even at a smaller thickness of photosensitive layer." Col. 3, lines 39-46; example 1, col. 11, lines 12-19; and Table 1 at col. 13, example 1.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Takaya, to use the undercoat layer taught by Takaya having a 10-point surface roughness Rz of 0.5 μm as the undercoat layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and Nukada, and to use the resultant photoreceptor in the image forming apparatus and process cartridge rendered obvious over the combined teachings of Niimi'633 and Nukada. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The combined teachings of Niimi'633, Nukada, and Takaya meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer

taught by Nukada have primary particle diameters of 0.05 to 0.08 μm. The primary particle diameters of 0.05 to 0.08 μm are smaller than the Takaya undercoat layer 10-point surface roughness of 0.5 μm and are also not greater than 2/3 of the roughness of 0.5 μm (i.e., 0.33 μm), as recited in instant claims 1 and 28.

10. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission I, combined with: (1) Nukada, as evidenced by the ACS File Registry RN 26201-32-1; and (2) Takaya, as applied to claim 20 above, further combined with US 2002/0051654 A1 (Niimi'654).

Niimi'633, as evidenced by applicants' admission I, combined with (1) Nukada, as evidenced by the ACS File Registry RN 26201-32-1, and (2) Takaya, renders obvious an image forming apparatus as described in paragraph 9, which is incorporated herein by reference.

As discussed in paragraph 9 above, Niimi'633 teaches that the charger in its image forming apparatus can preferably be a proximity charger as recited in instant claim 20. Page 4, paragraph 0062. However, Niimi'633 does not teach that the proximity charger forms a gap between the photoreceptor and the

charger of not greater than 200 µm, as recited in instant claim 21.

Niimi'654 teaches a proximity charging device comprising a charger roller **81** that comprises gap members **41a** and **41b** at the end of the roller. See Figs. 1 and 3, and paragraphs 0087 and 0089. The gap formed between the charger roller and the photoreceptor is preferably from 10 to 200 µm, i.e., the thickness of the gap members, which meets the charger limitations recited in instant claim 21. Page 3, paragraph 0034, and page 6, paragraph 0103. According to Niimi'654, "[w]hen the thickness of the gap members is too thin, there is a possibly that the charger **81** contacts the photoreceptor . . . the toner remaining on the surface of the photoreceptor . . . tends to adhere to the charger **81**. When the thickness is too thick, the voltage applied to the charger **81** has to be increased, resulting in increase of electric power consumption." Paragraph 0103. Niimi'654 further discloses that when charging, the charger applies a DC voltage overlapped with an AC voltage to the photoreceptor to avoid uneven charging, which meets the charger limitation recited in instant claim 22. Page 9, paragraph 0152; and page 26, paragraph 0472. According to Niimi'654, its proximity charger does "not cause uneven charging even when used for a long period of time, resulting in

formation of good images for a long period of time."
Paragraph 0030.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Niimi'654, to use Niimi'654 proximity charger as the proximity charger in the image forming apparatus rendered obvious over the combined teachings of Niimi'633, Nukada, and Takaya. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that does "not cause uneven charging even when used for a long period of time, resulting in formation of good images for a long period of time."

11. Claims 1, 7, 8, 10, 14, 15, 17, 19, 23, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,399,262 B1 (Oshiba) combined with Nukada, as evidenced by the ACS File Registry RN 26201-32-1.

Oshiba discloses an electrophotographic photoreceptor comprising an aluminum cylinder, as the electroconductive substrate, an intermediate layer, a charge generation layer, a charge transport layer, and a protective layer. The aluminum cylinder has a 10-point average surface roughness (Rz) of 1.0 μm, which is subjected to an alumite process. Col. 30, lines 1-24; col. 39, line 20, to col. 40, line 37; and

example 26 at col. 41. The alumite process comprises the step of subjecting the aluminum cylinder to anodic oxidation treatment. Col. 33, lines 39-48. The Oshiba conductive aluminum cylinder meets the conductive substrate limitation recited in instant claim 15. The surface layer comprises a siloxane resin that has "charge transportability." See example 26. The Oshiba surface layer meets the compositional limitations recited in instant claims 10 and 14.

The charge transport layer in the photoreceptor in example 26 of Oshiba is obtained by coating the charge generation layer with a coating solution comprising a binder resin, a charge transport compound, and the solvent 1,2-dichlorethane. Oshiba further teaches that the solvent can most preferably be, in addition to 1,2-dichloroetane, dichlormethane or methyl ethyl ketone. Col. 30, lines 47-49. The solvent methyl ethyl ketone meets the non-halogen solvent compositional limitations recited in instant claims 1 and 28. The choice of methyl ethyl ketone from a list of three solvents would have been obvious to a person having ordinary skill in the art.

According to Oshiba, when a photoreceptor comprises the Oshiba conductive substrate and surface layer, the photoreceptor exhibits high surface hardness, high wear resistance, and high flaw resistance. The photoreceptor exhibits consistent

electrophotographic properties at high temperature and high humidity during repeated use. The photoreceptor repeatedly produces excellent images, and does not "form a moire during the formation of digital images employing a laser beam and the like." Col. 3, lines 8-15.

Oshiba further discloses that its photoreceptor may be used as the photoreceptor in an image forming apparatus or a process cartridge. The image forming apparatus comprises a photoreceptor **10**, a charger **12**, an exposing unit **13**, developing units **14**, and a transfer device **18**. Col. 31, line 42, to col. 32, line 37. Oshiba teaches that the exposing unit **13** comprises a laser diode as the exposure light as recited in instant claim 19. Col. 31, lines 57-59. Oshiba further teaches that the image forming apparatus comprises a detachable process cartridge that comprises the photoreceptor **10**, the charger **40**, a separation unit, and a cleaning unit. Fig. 1 and col. 32, lines 63-65.

Oshiba does not exemplify a charge generation layer comprising a polyvinyl acetal resin and a charge generation material having an average particle diameter as recited in the instant claims. However, Oshiba discloses that the charge generation material in the charge generation layer can comprise a phthalocyanine pigment and a binder resin. Oshiba does not

limit the type of binder resin used. Col. 27, lines 61-62; and col. 28, line 49.

Nukada teaches a titanyl phthalocyanine crystal that exhibits an X-ray diffraction pattern that meets the "X-ray diffraction spectrum" recited in instant claims 1, 28, and 29. The titanyl phthalocyanine crystal also meets the compositional limitations recited in instant claims 1, 7, 8, 28, and 29, and the average particle size limitation of not greater than 0.3 μm recited in instant claims 1 and 28. The discussions of Nukada and the ACS File Registry RN 26201-32-1 in paragraph 9 above are incorporated herein by reference. As discussed in paragraph 9 above, Nukada further discloses a charge generating layer where the layer is formed by coating a coating solution comprising a polyvinyl butyral binder resin, the titanyl phthalocyanine crystal of example 1, and a solvent.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Oshiba and Nukada, to use methyl ethyl ketone as the solvent in forming the charge transport layer in the photoreceptor disclosed by Oshiba, and to use the charge generation layer coating solution taught by Nukada to form the charge generation layer in the photoreceptor disclosed by Oshiba, and to use the resultant photoreceptor in the image forming apparatus and process cartridge disclosed by

Oshiba. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have excellent photosensitivity, stability, and durability as taught by Nukada, and that exhibit consistent electrophotographic properties at high temperature and high humidity during repeated use and that produce excellent images as taught by Oshiba.

The combined teachings of Oshiba and Nukada meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer taught by Nukada have primary particle diameters of 0.05 to 0.08 μm. The primary particle diameters of 0.05 to 0.08 μm are smaller than the Oshiba aluminum cylinder surface roughness of 1.0 μm and is also not greater than 2/3 of the roughness of 1.0 μm (i.e., 0.66 μm), as recited in instant claims 1 and 28.

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshiba combined with Nukada, as evidenced by the ACS File Registry RN 26201-32-1, as applied to claim 1 above, further combined with further with US 5,496,671 (Tamura).

Oshiba combined with Nukada, as evidenced by the ACS File Registry RN 26201-32-1, renders obvious an electrophotographic

photoreceptor as described in paragraph 11, which is incorporated herein by reference.

Oshiba does not exemplify a charge transport layer comprising a charge transport polymer as recited in instant claim 9. However, Oshiba does not limit the type of charge transport layer used. See reference claim 4.

Tamura teaches a charge transport layer comprising a charge transport polymer comprising a triarylamine moiety in the side chain of the polymer, which meets the charge transport polymer limitation recited in instant claim 9. The charge transport layer is formed by coating the charge generation layer with a solution comprising the carbon-carbon double bond containing triarylamine compound CTM-3, a carbon-carbon double bond-containing monomer, and toluene, and photo-setting the coating to form the charge transport polymeric layer. CTM-3 at col. 7; synthesis example 1 at col. 42; and example 1 at col. 43, lines 15-26. The Tamura charge transport layer meets the charge transport layer limitations recited in instant claim 9. According to Tamura, an electrophotographic photoconductor comprising its charge transport layer has improved mechanical strength and high photosensitivity and durability. Col. 1, lines 57-60.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Tamura, to use the charge transport layer taught by Tamura as the charge transport layer in the photoreceptor rendered obvious over the combined teachings of Oshiba and Nukada. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that has improved mechanical strength and high photosensitivity and durability as taught by Tamura.

13. Applicants' arguments filed on Feb. 22, 2006, with respect to the rejections set forth in paragraphs 9-12 above, have been fully considered but they are not persuasive.

Applicants assert that the Nukada titanyl phthalocyanine does not have the X-ray diffraction pattern having a peak at 23.5° $\pm$ 0.2°, as recited in instant claims 1 and 28. Applicants further assert that none of the references discloses or suggests the instantly claimed photoreceptor for the reasons of applicants.

However, as discussed in the rejection in paragraph 9 above, the Nukada titanyl phthalocyanine has an X-ray diffraction pattern that meets the "spectrum" recited in instant claims 1, 28, and 29. The Nukada X-ray diffraction pattern has

a peak at a Bragg angle of at 23.5° ± 0.2°. See Nukada, Fig. 4. As discussed in the rejection in paragraph 9, although Nukada does not explicitly disclose the chemical structure of its titanyl phthalocyanine, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. Accordingly, the Nukada titanyl phthalocyanine meets the titanyl phthalocyanine recited in instant claims 1, 28, and 29.

Moreover, the reasons for combining the references do not have to be those of applicants. For the reasons discussed in the rejections in paragraphs 9 and 11 above, Nukada provides reason, suggestion, and motivation to use its titanyl phthalocyanine as the charge generation material in the photoreceptor disclosed by Niimi'633 or in the photoreceptor disclosed by Oshiba. Takaya provides reason, suggestion, and motivation to use the intermediate layer as the intermediate layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and Nukada. Furthermore, the combined teachings of Niimi'633, Nukada, and Takaya and the combined teachings of Oshiba and Nukada both render obvious a photoreceptor that meets the compositional, particle size, and surface roughness limitations recited in the instant claims.

Applicants' arguments regarding the surface roughness of the conductive substrate are without merit. The instant claims do not require that the photoreceptor comprise a conductive substrate having a particular surface roughness. Instant claims 1 and 28 recite that the charge generation material has "an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer" (emphasis added).

Accordingly, the rejections set forth in paragraphs 9-12 stand.

14. Claims 1, 8, 10-14, 16-20, 22, 23, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission I, combined with (1) Japanese Patent 11-140337 (JP'337), as evidenced by Ladd et al., Structure Determination by X-ray Diffraction, p. 426 (Ladd), and (2) Takaya. See the USPTO English-language translation of JP'337 for cites.

Niimi'633, as evidenced by applicants' admission I, discloses an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge as described in paragraph 9 above, which is incorporated herein by reference.

Niimi'633 does not exemplify a charge generation layer comprising a charge generation material having an average particle diameter as recited in the instant claims. However, Niima'633 discloses that the charge generation material in the charge transport layer can equally be a phthalocyanine pigment. Page 10, paragraph 0151, line 1-2.

JP'337 teaches a dispersion comprising a titanyl phthalocyanine crystal that exhibits an X-ray diffraction pattern having a maximum peak at a Bragg angle ($2\theta \pm 0.2°$) of 27.2°, a lowest peak at 7.3°, a peak at 9.5°, no peak at 26.3°, and a peak at 23.5°. The diffraction pattern is obtained by irradiating the titanyl phthalocyanine with a X-ray of Cu-Kα having a wavelength of "1.514 Å." Translation, paragraph 0007 and 0050-0051; Fig. 7; and dispersion 2 in paragraph 0053 and in Table 1 at page 39. The interval between the peaks at angles of 7.3° and 9.5° meet the limitation "an interval . . . is not less than 2.0°" recited in instant claims 1 and 28. The location of the peaks at angles 7.3°, 9.5°, and 23.5° were determined by measuring the positions of the peaks with a ruler and correlating the positions with the x-axis in Fig. 7. The JP'337 titanyl phthalocyanine is represented by formula (2) disclosed at page 12, lines 1-4, of the translation, which meets the compositional limitations of formula (1) recited in instant

claim 28. Thus, the titanyl phthalocyanine crystal meets the compositional limitations recited in instant claims 1, 8, 28, and 29. According to JP'337, when the dispersion of titanyl phthalocyanine is used to form a charge generation layer in a photoreceptor, the resulting photoreceptor has high sensitivity even after repeated use. The chargeability of the photoreceptor does not decrease and the residual potential does not increase after repeated use. Translation, paragraph 0006.

The JP'337 reported wavelength of 1.514 Å appears to be a typographic error. The Cu-Kα wavelength of 1.514 Å does not appear to exist. It is well-known that the Cu-Kα spectra line is a doublet consisting of α1 (λ = 1.5405) and α2 (λ = 1.5443). The weighted mean Kα line is 1.542 Å, which is the value normally used in Cu-Kα X-ray diffraction. See Ladd, p. 426. Accordingly, because JP'337 teaches using the X-ray of Cu-Kα and that Cu-Kα is known in the art to have mean wavelength of 1.542 Å, it is reasonable to presume that the X-ray diffraction pattern disclosed in JP'337 is determined with Cu-Kα having a wavelength of 1.542 Å, as recited in the instant claims. The burden is on applicants to prove otherwise. <u>Fitzgerald</u>, <u>supra</u>.

JP'337 does not explicitly disclose that the titanyl phthalocyanine crystal has an average particle diameter of not greater than 0.3 μm as recited in instant claims 1 and 28.

However, JP'337 discloses that the titanyl phthalocyanine is milled with a particular polyvinyl acetal and a solvent. The resultant dispersion comprises particles having a mean grain diameter of 0.28 µm. See the translation, Table 1 at page 39, dispersion 2. The dispersion particle size of 0.28 µm is within the range of not greater than 0.3 µm recited in instant claims 1 and 28. Thus, it is reasonable to conclude that the titanyl phthalocyanine crystal has an average particle diameter of not greater than 0.3 µm as recited in instant claims 1 and 28. The burden is on applicants to prove otherwise. Fitzgerald, supra.

Instant claim 8 is written in product-by-process format. JP'337 does not disclose that its titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the JP'337 titanyl phthalocyanine material exhibits an X-ray diffraction spectrum that appears to meet the limitations recited in instant claims 1, 28, and 29, as well as the particle size limitation of "not greater than 0.3 µm" recited in instant claims 1 and 28. Therefore, it appears that the titanyl phthalocyanine material disclosed by JP'337 is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the

instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'337, to use the dispersion taught by JP'337 to form the charge generation layer in the photoreceptor disclosed by Niimi'633, and to use the resultant photoreceptor in the image forming apparatus and process cartridge disclosed by Niimi'633. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have high photosensitivity and stable charging properties and residual potential properties after repeated use.

Niimi'633 also does not exemplify a photoreceptor comprising an undercoat layer having the surface roughness as recited in the instant claims. However, Niimi'633 does not limit the type of undercoat layer used. Page 12, paragraph 0180; and reference claim 22.

Takaya teaches the benefits of using of a particular undercoat layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member, which has a 10-point surface roughness Rz

of 0.5 µm. The discussion of Takaya in paragraph 9 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Takaya, to use the undercoat layer taught by Takaya having a 10-point surface roughness Rz of 0.5 µm as the undercoat layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and JP'337, and to use the resultant photoreceptor in the image forming apparatus and process cartridge rendered obvious over the combined teachings of Niimi'633 and JP'337. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The combined teachings of Niimi'633, JP'337, and Takaya meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed <u>supra</u>, the titanyl phthalocyanine crystal particles in the charge generation layer taught by JP'337 appear to have a mean particle diameter of 0.28 µm, which meets the limitation "not greater than 0.3 µm"

recited in instant claims 1 and 28. The mean particle diameter of 0.28 μm is smaller than the Takaya undercoat layer 10-point surface roughness of 0.5 μm and is also not greater than 2/3 of the roughness of 0.5 μm (i.e., 0.33 μm), as recited in instant claims 1 and 28.

15. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niimi'633, as evidenced by applicants' admission I, combined with: (1) JP'337, as evidenced by Ladd, and (2) Takaya, as applied to claim 20 above, further combined with Niimi'654. See the USPTO translation of JP'337 for cites.

Niimi'633, as evidenced by applicants' admission I, combined with JP'337, as evidenced by Ladd, and with Takaya, renders obvious an image forming apparatus as described in paragraph 14, which is incorporated herein by reference.

As discussed in paragraph 14 above, Niimi'633 teaches that the charger in its image forming apparatus can preferably be a proximity charger as recited in instant claim 20. Page 4, paragraph 0062. However, Niimi'633 does not teach that the proximity charger forms a gap between the photoreceptor and the charger of not greater than 200 μm, as recited in instant claim 21.

Niimi'654 teaches a proximity charging device that meets the proximity charger limitations recited in instant claims 20-22. The discussion of Niimi'654 in paragraph 10 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Niimi'654, to use Niimi'654 proximity charger as the proximity charger in the image forming apparatus rendered obvious over the combined teachings of Niimi'633, JP'337, and Takaya. That person would have had a reasonable expectation of successfully obtaining an image forming apparatus that does "not cause uneven charging even when used for a long period of time, resulting in formation of good images for a long period of time."

16. Claims 1, 8, 10, 14, 15, 17, 19, 23, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oshiba combined with JP'337, as evidenced by Ladd.

Oshiba discloses an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge as described in paragraph 11 above, which is incorporated herein by reference.

Oshiba does not exemplify a charge generation layer comprising a polyvinyl acetal resin and a charge generation material having an average particle diameter as recited in the

instant claims. However, Oshiba discloses that the charge generation material in the charge generation layer can comprise a phthalocyanine pigment and a binder resin such as polyvinyl butyral. Col. 27, lines 61-62; and col. 28, line 44.

JP'337 teaches a titanyl phthalocyanine crystal that exhibits an X-ray diffraction pattern that meets the "X-ray diffraction spectrum" recited in instant claims 1, 28, and 29. The JP'337 titanyl phthalocyanine crystal also meets the compositional limitations recited in instant claims 1, 8, 28, and 29. The discussions of JP'337 and Ladd in paragraph 14 above are incorporated herein by reference. As discussed in paragraph 14 above, JP'337 further discloses a charge generating layer where the layer is formed by coating a dispersion solution comprising a polyvinyl acetal binder resin, its titanyl phthalocyanine crystal, and a solvent.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Oshiba and JP'337, to use methyl ethyl ketone as the solvent in forming the charge transport layer in the photoreceptor disclosed by Oshiba, and to use the JP'337 dispersion to form the charge generation layer in the photoreceptor disclosed by Oshiba, and to use the resultant photoreceptor in the image forming apparatus and process cartridge disclosed by Oshiba. That person would have

had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that have high photosensitivity and stable charging properties and residual potential properties after repeated use as taught by JP'337, and that exhibit consistent electrophotographic properties at high temperature and high humidity during repeated use and that produce excellent images as taught by Oshiba.

The combined teachings of Oshiba and JP'337 meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer taught by JP'337 appear to have a mean particle diameter of 0.28 µm, which meets the limitation "not greater than 0.3 µm" recited in instant claims 1 and 28. The mean particle diameter of 0.28 µm is smaller than the Oshiba aluminum cylinder surface roughness of 1.0 µm and is also not greater than 2/3 of the roughness of 1.0 µm (i.e., 0.66 µm), as recited in instant claims 1 and 28.

17. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oshiba combined with JP'337, as evidenced by

Ladd, as applied to claim 1 above, further combined with further with Tamura.

Oshiba combined with JP'337, as evidenced by Ladd, renders obvious an electrophotographic photoreceptor as described in paragraph 16, which is incorporated herein by reference.

Oshiba does not exemplify a charge transport layer comprising a charge transport polymer as recited in instant claim 9. However, Oshiba does not limit the type of charge transport layer used. See reference claim 4.

Tamura teaches a charge transport layer comprising a charge transport polymer comprising a triarylamine moiety in the side chain of the polymer, which meets the charge transport polymer limitation recited in instant claim 9. The discussion of Tamura in paragraph 12 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings in Tamura, to use the charge transport layer taught by Tamura as the charge transport layer in the photoreceptor rendered obvious over the combined teachings of Oshiba and JP'337. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that has improved mechanical strength and high photosensitivity and durability as taught by Tamura.

18. Applicants' arguments filed on Feb. 22, 2006, with respect to the rejections set forth in paragraphs 14-17 above, have been fully considered but they are not persuasive.

Applicants further assert that none of the references discloses or suggests the instantly claimed photoreceptor for the reasons of applicants.

However, as discussed in the rejection in paragraph 14 above, the JP'337 titanyl phthalocyanine meets the compositional limitations of formula (1) recited in instant claim 28 and has an X-ray diffraction pattern that meets the "spectrum" recited in instant claims 1, 28, and 29. The JP'337 X-ray diffraction pattern has a peak at the Bragg angles of at $23.5° \pm 0.2°$. See the translation, Fig. 7. Accordingly, the JP'337 titanyl phthalocyanine meets the titanyl phthalocyanine recited in instant claims 1, 28, and 29.

Moreover, the reasons for combining the references do not have to be those of applicants. For the reasons discussed in the rejections in paragraphs 14 and 16 above, JP'337 provides reason, suggestion, and motivation to use its titanyl phthalocyanine as the charge generation material in the photoreceptor disclosed by Niimi'633 or in the photoreceptor disclosed by Oshiba. Takaya provides reason, suggestion, and

motivation to use the intermediate layer as the intermediate layer in the photoreceptor rendered obvious over the combined teachings of Niimi'633 and JP'337. Furthermore, the combined teachings of Niimi'633, JP'337, and Takaya and the combined teachings of Oshiba and JP'337 both render obvious a photoreceptor that meets the compositional, particle size, and surface roughness limitations recited in the instant claims.

Accordingly, the rejections over the combined teachings of prior art set forth in paragraphs 14-17 stand.

19. Claims 1, 7-23, 28, and 29 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-35 of US Patent No. 7,029,810 B2 (Toda), as evidenced by that portion of the disclosure in Toda that supports the claimed subject matter in claims 1-35 of Toda and the ACS File Registry RN 26201-32-1, in view of Takaya and US 4,734,348 (Suzuki). Toda was US application serial no. 10/665,155.

Reference claim 33, which depends from reference claim 32, which in turn depends from reference claim 21, recites an electrophotographic photoreceptor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer formed on the charge generation layer

using the halogen-free solvent of cyclic ethers or aromatic hydrocarbons. The charge transport layer meets the charge transport layer limitations recited in instant claims 1, 16, and 28. The charge generation layer comprises a titanyl phthalocyanine crystal. The titanyl phthalocyanine crystal has an CuKα 1.542 Angstrom X-ray diffraction spectrum comprising a maximum peak at a Bragg angle of 27.2° ± 0.2° and a peak at a lowest Bragg angle of 7.3° ± 0.2° and peaks at 9.4° ± 0.2° and 9.6° ± 0.2°. No diffraction peak is observed at an angle greater than 7.3° and less than 9.4°. Reference claim 22, which depends from claim 21, requires that the X-ray diffraction spectrum comprise no peak at a Bragg angle of 26.3°, which meets the X-ray diffraction spectrum recited in instant claim 28.

The claims of Toda do not recite that the titanyl phthalocyanine crystal has the chemical structure in formula (1) recited in instant claim 28. Nor do the claims of Toda recite that the titanyl phthalocyanine crystal X-ray diffraction spectrum has a peak at the Bragg angle of 23.5° as recited in instant claims 1 and 29. However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. As discussed

above, the peaks at the Bragg angles in the X-ray diffraction spectrum recited in Toda are within the scope of the X-ray diffraction spectrum recited in instant claims 28. That spectrum is also within the scope of the diffraction spectrum recited in instant claims 1 and 29, but for the peak at 23.5°. Furthermore, that portion of Toda that supports the titanyl phthalocyanine crystal recited in the reference claims teaches that such a titanyl phthalocyanine crystal has an X-ray diffraction spectrum that has a peak at the Bragg angle of 23.5°. See Toda, synthesis example 8 at cols. 33-34, and Fig. 7. When addressing the use of whether a claim in the application defines an obvious variation of an invention claimed in a patent, "those portions of the specification which support the patent claims may be also be examined and considered." See MPEP 804,II.B.1, p. 800-22, citing In re Vogel, 164 USPA 619, 622 (CCPA 1970). Thus, it is reasonable to presume that the titanyl phthalocyanine crystal recited in the reference claims of Toda has the chemical structure recited in instant claim 28 and has an X-ray diffraction spectrum that has a peak at the Bragg angle of 23.5° as shown in Toda Fig. 7 that meets the spectrum recited in instant claims 1, 28, and 29. The burden is on applicants to prove otherwise. Fitzgerald, supra.

Reference claim 23, which depends from reference claim 21, requires that the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3 μm, which is within the particle size limitation recited in instant claims 1 and 28. The subject matter recited in references claim 24 and 25, which depend from reference claim 21, meets the titanyl phthalocyanine and the process limitations recited in instant claims 7 and 8. Reference claim 26, which depends from reference claim 21, requires that the charge transport layer comprise a charge transport polymer that meets the charge transport polymer limitations recited in instant claim 9. Reference claims 27-31, which depend from reference claim 21, require that the photoreceptor further comprise a protective layer that meets the surface protective layer limitations recited in instant claims 10-14. Reference claim 34, which depends on reference claim 21, requires that the conductive substrate comprise an oxide film formed by anodization. The anodized oxide film meets the substrate limitation recited in instant claim 15.

References 1 and 18-20 recite an image forming apparatus comprising an image forming unit comprising a photoreceptor, a charging unit, a light-irradiating unit, a developing unit, and a transferring unit that meet the charging, light-irradiating

unit, developing unit, and transporting unit limitations recited in instant claims 17 and 19-22. Reference claim 17, which depends on reference claim 1, further requires that the image forming apparatus comprise a plurality of image forming units that meets the apparatus limitation recited in instant claim 18. Reference claim 35, which depends from reference claim 1, further requires that the apparatus comprise a detachable cartridge comprising the photoreceptor and a member selected from the group consisting of chargers, irradiators, and developers that meet the units limitations recited in instant claim 23. The apparatus and process cartridge recited in the reference claims 1 and 35 comprise a photoreceptor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer. The charge generation layer comprises titanyl phthalocyanine crystals. Reference claim 5, which depends from reference claim 1, requires that the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3 μm, which is within the particle size limitation recited in instant claims 1 and 28. Reference claim 14, which depends on reference claim 1, requires that the charge transport layer be formed with a non-halide solvent that meets the charge transport layer limitation recited in instant claims 17 and 23.

The reference claims do not recite the presence of an intermediate layer located between the electroconductive substrate and the charge generation layer having a surface roughness as recited in the instant claims.

Takaya teaches the benefits of using of a particular intermediate layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member, which has a 10-point surface roughness Rz of 0.5 μm. The discussion of Takaya in paragraph 9 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the reference claims in Toda, as evidenced by that portion of the disclosure in Toda that supports the claimed subject matter in claims of Toda and the ACS File Registry RN 26201-32-1, and the teachings in Takaya, to use the intermediate layer taught by Takaya having a 10-point surface roughness Rz of 0.5 μm between the electroconductive substrate and the charge generation layer in the photoreceptor recited in the reference claims of Toda, wherein the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3 μm, and the charge transport layer is formed from a non-halide solvent. That person would have had a reasonable expectation of successfully

obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The reference claims also do not recite that the charge generation layer comprises a polyvinyl acetal binder resin.

Suzuki discloses a polyvinyl acetal resin that meets the limitations recited in instant claims 1, 17, 23, and 28. See Example 11 at col. 13. Suzuki discloses that the polyvinyl acetal resin can be used as the binder resin in a single photosensitive layer or in a charge generation layer. Col. 4, lines 10-13. Suzuki discloses that said polyvinyl acetal resin provides photosensitive layers having stably dispersed photoconductive particles and excellent electric properties, such as high sensitivity and low residual potential. Col. 2, lines 10-15, and col. 11, lines 56-60.

It would have been obvious for a person having ordinary skill in the art, in view of subject matter recited in the reference claims of Toda and the teachings of Suzuki, to use the Suzuki polyvinyl acetal resin as the binder resin in the charge generation layer in the photoreceptor rendered obvious over the

subject matter recited in the reference claims of Toda, as evidenced by that portion of Toda that supports that subject matter claimed in Toda and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya. That person would have had a reasonable expectation of successfully obtaining a stable titanyl phthalocyanine dispersion and a photoreceptor, an image forming apparatus, and a process cartridge that have excellent electric properties, such as high sensitivity and low residual potential, as disclosed by Suzuki.

The subject matter recited in the reference claims of Toda, as evidenced by that portion of Toda that supports the subject matter claimed in Toda and ACS File Registry RN 26201-32-1, combined with the teachings of Takaya and Suzuki meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer recited in the reference claims of Toda have an average primary particle diameter of less than 0.3 µm. The average primary particle diameter of less than 0.3 µm is smaller than the Takaya undercoat layer 10-point surface roughness of 0.5 µm and is also not greater than 2/3 of the roughness of 0.5 µm (i.e., 0.33 µm), as recited in instant claims 1 and 28.

Applicants' arguments filed on Feb. 22, 2006, have been fully considered but they are not persuasive.

Applicants assert that the terminal disclaimer filed on Feb. 22, 2006, overcomes the rejection over Toda, i.e., Application 10/665,155.

However, the terminal disclaimer filed on Feb. 22, 2006, is improper. The application/patent being disclaimed has been improperly identified since the number used to identify the application, i.e., application serial no. 10/655,155, being disclaimed is incorrect. The correct number is application serial no. 10/665,155.

Accordingly, the rejection stands.

20. Claims 1, 7-23, 28, and 29 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 and 20-27 of copending Application No. 10/804,067 (Application'067), as evidenced by that portion of the disclosure in Application'067 that supports the claimed subject matter in claims 1-18 and 20-27 of Application'067, and the ACS File Registry RN 26201-32-1.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter recited in the claims of Application'067 renders the subject matter recited in the instant claims obvious.

Reference claims 2 and 3, which each depend directly from reference claim 1, recite an electrophotographic photoconductor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer formed on the charge generation layer using a halogen-free solvent. The charge generation layer comprises a particular polyvinyl acetal resin and a charge generation material that has an average particle diameter smaller than the "surface roughness plane," where the plane is the electroconductive substrate or an interlayer disposed between the substrate and the charge generation layer, recited in reference claims 2 and 3, respectively. The "surface roughness plane" has the same meaning as "surface roughness" recited in the instant claims. Compare paragraph 7 above and Application'067, page 3, paragraph 0052. Reference claim 4, which depends on reference claim 1, requires that the average particle diameter of the charge generation material be 0.3 µm or

less and two-thirds or less than the surface roughness of the plane, which meets the particle size limitations recited in instant claims 1 and 28.

The subject matter recited in reference claims 5-18, which depend from reference claim 1, expressly meets the titanyl phthalocyanine, the process limitation, the charge transport polymer, the surface protective layer, the substrate, and non-halogenated solvent limitations recited in instant claims 1, 7-16, 28, and 29, respectively, but for the limitation that the X-ray diffraction spectrum has a peak at 23.5° and the chemical structure recited in instant claims 28 and 29.

However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. As discussed above, the peaks at the Bragg angles in the X-ray diffraction spectrum recited in Applicaton'067 are within the scope of the X-ray diffraction spectrum recited in instant claims 28. That spectrum is also within the scope of the diffraction spectrum recited in instant claims 1 and 29, but for the peak at 23.5°. Furthermore, that portion of Application'067 that supports the titanyl phthalocyanine crystal recited in the reference claims teaches

that such a titanyl phthalocyanine crystal has an X-ray diffraction spectrum that has a peak at the Bragg angle of 23.5°. See Application'067, preparation example at pages 50-52 and Fig. 6. When addressing the use of whether a claim in the application defines an obvious variation of an invention claimed in a patent, "those portions of the specification which support the patent claims may be also be examined and considered." See MPEP 804,II.B.1, p. 800-22, citing In re Vogel, 164 USPA 619, 622 (CCPA 1970). Thus, it is reasonable to presume that the titanyl phthalocyanine crystal recited in the reference claims of Application'067 has the chemical structure recited in instant claim 28 and has an X-ray diffraction spectrum that has a peak at the Bragg angle of 23.5° as shown in Application'067 Fig. 6 that meets the spectrum recited in instant claims 1, 28, and 29. The burden is on applicants to prove otherwise. Fitzgerald, supra.

References 20 and 22-26 recite an image forming apparatus comprising an image forming unit that comprises a charging unit, a light-irradiating unit, a developing unit, and a transferring unit that meet the charging, light-irradiating unit, developing unit, and transporting unit limitations recited in instant claims 17 and 19-22. Reference 21, which depends on reference claim 20, further requires that the image forming apparatus

comprise a plurality of image forming units that meets the apparatus limitation recited in instant claim 18. Reference claim 27 recites a process cartridge comprising at least one of charging unit, a light-irradiating unit, and a developing unit that meet the units limitations recited in instant claim 23. The apparatus and the process cartridge recited in the claims of Application'067 both comprise a photoconductor as recited in reference claim 1.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the claims of Application'067, as evidenced by that portion of the disclosure in Application'067 that supports the claimed subject matter in claims of Application'067, and the ACS File Registry RN 26201-32-1, to make and use an electrophotographic photoconductor that meets the photoreceptor limitations recited in the instant claims, and to use the resultant photoconductor in the imaging apparatus and process cartridge recited in Application'067. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoconductor, an imaging apparatus, and a process cartridge that could be used successfully in an electrophotographic process to form toner images.

21. Claims 1, 8-10, 15-18, 20-23, 28, and 29 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-18 of copending Application No. 10/656,280 (Application'280), as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims 1-18 of Application'280, and the ACS File Registry RN 26201-32-1, in view of Takaya and Suzuki.

This is a provisional obviousness-type double patenting rejection.

Reference claim 8, which depends from claim 7, which in turn depends from reference claim 1, recites an image forming apparatus comprising an electrophotographic photoreceptor comprising an electroconductive substrate, a charge generation layer, and a charge transport layer formed on the charge generation layer using the non-halogen solvent of cyclic ethers or aromatic hydrocarbons. The charge transport layer meets the charge transport layer limitations recited in instant claims 1, 16, and 28. The charge generation layer comprises titanyl phthalocyanine crystals. The titanyl phthalocyanine crystal has an CuKα 1.542 Angstrom X-ray diffraction spectrum comprising a maximum peak at a Bragg angle of $27.2° \pm 0.2°$ and a peak at a lowest Bragg angle of $7.3° \pm 0.2°$ and peaks at $9.4° \pm 0.2°$ and

9.6° ± 0.2°. No diffraction peak is observed within a range of from 7.3° to 9.4°. Reference claim 2, which depends from claim 1, requires that the X-ray diffraction spectrum comprise no peak at a Bragg angle of 26.3°, which meets the X-ray diffraction spectrum recited in instant claim 28.

The claims of Application'280 do not recite that the titanyl phthalocyanine crystal has the chemical structure in formula (1) recited in instant claim 28. Nor do the claims of Application'280 recite that the titanyl phthalocyanine crystal X-ray diffraction spectrum has a peak at the Bragg angle of 23.5° as recited in instant claims 1 and 29. However, as evidenced by the ACS File Registry RN 26201-32-1, it is well known that titanyl phthalocyanine has a chemical structure that is within the compositional limitations of formula (1) recited in instant claim 28, when the indexes m, n, j, and k are 0. As discussed above, the peaks at the Bragg angles in the X-ray diffraction spectrum recited in Application'280 are within the scope of the X-ray diffraction spectrum recited in instant claims 28. That spectrum is also within the scope of the diffraction spectrum recited in instant claims 1 and 29, but for the peak at 23.5°. Furthermore, that portion of Application'280 that supports the titanyl phthalocyanine crystal recited in the reference claims teaches that such a titanyl phthalocyanine crystal has an X-ray

diffraction spectrum that has a peak at the Bragg angle of 23.5°. See Application'280, synthesis example 1 at pages 84-85, example 1 at pages 93-94, and Fig. 9. When addressing the use of whether a claim in the application defines an obvious variation of an invention claimed in a patent, "those portions of the specification which support the patent claims may be also be examined and considered." See MPEP 804,II.B.1, p. 800-22, citing In re Vogel, 164 USPA 619, 622 (CCPA 1970). Thus, it is reasonable to presume that the titanyl phthalocyanine crystal recited in the reference claims of Application'280 has the chemical structure recited in instant claim 28 and has an X-ray diffraction spectrum that has a peak at the Bragg angle of 23.5° as shown in Application'280 Fig. 9 that meets the spectrum recited in instant claims 1, 28, and 29. The burden is on applicants to prove otherwise. Fitzgerald, supra.

Reference claim 3, which depends from reference claim 1, requires that the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3 μm, which is within the particle size limitation recited in instant claims 1 and 28. Reference claim 4, which depends from reference claim 1, requires that the charge transport layer comprise a polycarbonate having, on the main chain and/or side chain thereof, a triarylamine structure, which meets the charge

transport polymer limitations recited in instant claim 9. Reference claim 5, which depend from reference claim 1, requires that the photoreceptor further comprise a protective layer that meets the surface protective layer limitations recited in instant claim 10. Reference claim 9, which depends on reference claim 1, requires that the conductive substrate comprise an oxide film formed by anodization. The anodized oxide film meets the substrate limitation recited in instant claim 15.

Reference claims 1 and 11-15 recite that the image forming apparatus further comprises a charging unit, a light-irradiating unit, a developing unit, and a transferring unit that meet the charging, light-irradiating unit, developing unit, and transporting unit limitations recited in instant claims 17 and 20-22. Reference claim 10, which depends on reference claim 1, further requires that the image forming apparatus comprise a plurality of image forming units, thereby meeting the apparatus limitation recited in instant claim 18. Reference claim 15, which depends from reference claim 1, further requires that the apparatus comprise a detachable cartridge comprising the photoreceptor and a member selected from the group consisting of a charger, an irradiator, and a developer, which meets the unit limitations recited in instant claim 23.

Instant claim 8 is written in product-by-process format. The reference claims do not recite that the titanyl phthalocyanine material is obtained by the method recited in instant claim 8. However, the titanyl phthalocyanine material recited in the claims of Application'280 exhibits an X-ray diffraction spectrum that appears to meet the limitations recited in instant claims 1, 28, and 29, and the particle size limitation of "not greater than 0.3 μm" recited in instant claims 1 and 28. Therefore, it appears that the titanyl phthalocyanine material recited in the claims of Application'280 is the same or substantially the same as the instantly recited titanyl phthalocyanine crystal made by the process steps recited in the instant claim. The burden is on applicants to prove otherwise. Marosi; Thorpe; MPEP 2113.

The reference claims do not recite the presence of an intermediate layer located between the electroconductive substrate and the charge generation layer having a surface roughness as recited in the instant claims.

Takaya teaches the benefits of using of a particular intermediate layer located between the charge generation layer and the electroconductive substrate of an electrophotographic photosensitive member, which has a 10-point surface roughness Rz

of 0.5 μm. The discussion of Takaya in paragraph 9 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the subject matter recited in the reference claims in Application'280, as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, and the teachings in Takaya, to use the intermediate layer taught by Takaya having a 10-point surface roughness Rz of 0.5 μm between the electroconductive substrate and the charge generation layer in the photoreceptor recited in the reference claims of Application'280, wherein the titanyl phthalocyanine crystals have an average primary particle size of less than 0.3 μm, and the charge transport layer is formed from a non-halogen solvent. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor, an image forming apparatus, and a process cartridge that prevent the occurrence of interference fringes and exhibit excellent potential characteristics and image forming characteristics free from difficulties over a variety of temperature and humidity environment conditions as disclosed by Takaya.

The reference claims also do not recite that the charge generation layer comprises a polyvinyl acetal binder resin.

Suzuki discloses a polyvinyl acetal resin that meets the limitations recited in instant claims 1, 17, 23, and 28. The discussion of Suzuki in paragraph 19 above is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of subject matter recited in the reference claims of Application'280 and the teachings of Suzuki, to use the Suzuki polyvinyl acetal resin as the binder resin in the charge generation layer in the photoreceptor rendered obvious over the subject matter recited in the reference claims of Application'280, as evidenced by that portion of the disclosure in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya. That person would have had a reasonable expectation of successfully obtaining a stable titanyl phthalocyanine dispersion and a photoreceptor, an image forming apparatus, and a process cartridge that have excellent electric properties, such as high sensitivity and low residual potential, as disclosed by Suzuki.

The subject matter recited in the reference claims of Application'280, as evidenced by that portion of the disclosure

in Application'280 that supports the claimed subject matter in claims of Application'280 and the ACS File Registry RN 26201-32-1, combined with the teachings of Takaya and Suzuki meet the surface roughness - particle size relationships recited in instant claims 1 and 28. As discussed supra, the titanyl phthalocyanine crystal particles in the charge generation layer recited in the reference claims of Application'280 have an average primary particle diameter of less than 0.3 µm. The average primary particle diameter of less than 0.3 µm is smaller than the Takaya undercoat layer 10-point surface roughness of 0.5 µm and is also not greater than 2/3 of the roughness of 0.5 µm (i.e., 0.33 µm), as recited in instant claims 1 and 28.

22. In the response filed on Feb. 22, 2006, applicants did not traverse the rejections over the copending applications set forth in paragraphs 20 and 21 above.

23. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisor, Mr. Nam Nguyen, can be reached on (571) 272-1342. The central fax phone number is (571) 273-8300.

Any inquiry regarding papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Janis L. Dote
JANIS L. DOTE
PRIMARY EXAMINER
GROUP ~~1500~~ 1700

JLD
May 20, 2006